

SEQUENCE LISTING

<110> Frey, Joachim
 Stuber, Katja
 Thornton, Julian C
 Kuzyk, Michael A.
 Burian, Jan

<120> Type III Secretion Pathway in Aeromonas salmonicida, and Uses Therefor

<130> US001/2850/US

<140> US 10/813,908
 <141> 2004-03-26

<150> US 10/416,902
 <151> 2001-11-15

<150> PCT/CA 01/01589
 <151> 2001-11-15

<150> US 60/248,864
 <151> 2000-11-15

<160> 15

<170> PatentIn version 3.3

<210> 1
 <211> 47
 <212> PRT
 <213> Aeromonas salmonicida

<400> 1

Glu Leu Lys Arg Leu Ile Arg Leu Leu Pro Val Glu Leu Phe Ser Glu
 1 5 10 15

Glu Glu Gln Arg Gln Asn Leu Leu Gln Cys Cys Gln Gly Ala Leu Asp
 20 25 30

Asn Ala Ile Glu Arg Glu Glu Asp Glu Leu Ser Gly Glu Ser Ser
 35 40 45

<210> 2
 <211> 123
 <212> PRT
 <213> Aeromonas salmonicida

<400> 2

Met Asn Trp Ile Glu Pro Leu Leu Val Gln Phe Cys Gln Asp Leu Gly
 1 5 10 15

Ile Thr Ile Gly Asp Asn Pro His Ser Leu Ile Gln Leu Glu Leu Glu
 20 25 30

Gln Ser Gly Thr Leu Gln Leu Glu Arg His Gln Gly Gln Leu Thr Leu
 Page 1

35

40

45

Trp Leu Ala Arg Ala Val Pro Trp His Gln Ser Gly Glu Ala Ile Arg
50 55 60

Arg Ala Met Thr Leu Thr Ala Ala Ala Gln Gly Pro Ala Leu Pro Val
65 70 75 80

Arg Ser Gly Trp Leu Gly Glu Glu Gln Leu Ile Leu Phe Val Ser Leu
85 90 95

Asp Glu Arg Ala Val Thr Leu Pro Gln Leu His Gln Ala Val Thr Thr
100 105 110

Leu Thr Arg Leu Gln Arg Glu Val Leu Ala Ser
115 120

<210> 3
<211> 121
<212> PRT
<213> Aeromonas salmonicida

<400> 3

Met Ser Arg Ile Thr Ala Ala His Ile Gly Ile Glu Gln Leu Ser Ala
1 5 10 15

Ile Ser Leu Asp Asp Gln Glu Arg Ser Leu Pro Gly Arg Tyr Ala Leu
20 25 30

Leu Pro Asp Gly Gln Ser Ile Glu Pro His Ile Ser Arg Leu Tyr Pro
35 40 45

Glu Arg Leu Ala Asp Arg Val Leu Leu Asp Phe Ala Thr Pro Asp Arg
50 55 60

Gly Phe His Asp Leu Leu Arg Pro Val Asp Phe Asn Gln Ala Met Gln
65 70 75 80

Gly Leu Arg Ser Val Leu Ala Glu Gly Gln Ser Pro Glu Leu Arg Ala
85 90 95

Ala Ala Ala Leu Leu Glu Gln Met His Ala Asp Glu Gln Leu Met Gln
100 105 110

Met Thr Leu His Leu Leu His Lys Val
115 120

<210> 4
<211> 116

<212> PRT
 <213> Aeromonas salmonicida

<400> 4

Met Thr Met Val Leu Thr Ser Gln Gln Gln Asp Ala Leu Leu Leu Thr
 1 5 10 15

Gly Trp Leu Gln Leu Gln Tyr Gly His Pro Asp Lys Ala Ser Val Leu
 20 25 30

Leu Ala Ala Leu Leu Gln Ile His Pro Asp His Gln Gly Gly Arg Arg
 35 40 45

Thr Leu Leu Val Ala Leu Leu Lys Gln Gly Glu Gly Glu Ala Ala Leu
 50 55 60

Ala His Val Asp Gln Leu Met Gln Gln Gly Glu Ala Asp Gly Pro Leu
 65 70 75 80

Trp Leu Cys Arg Ser Arg Ala Cys Gln Leu Ala Gly Arg Leu Asp Glu
 85 90 95

Ala Arg Phe Ala Tyr Gln Gln Tyr Leu Glu Leu Glu Glu Gln Asn Glu
 100 105 110

Ser Thr His Pro
 115

<210> 5
 <211> 116
 <212> PRT
 <213> Aeromonas salmonicida

<400> 5

Met Thr Met Val Leu Thr Ser Gln Gln Gln Asp Ala Leu Leu Leu Thr
 1 5 10 15

Gly Trp Leu Gln Leu Gln Tyr Gly His Pro Asp Lys Ala Ser Val Leu
 20 25 30

Leu Ala Ala Leu Leu Gln Ile His Pro Asp His Gln Gly Gly Arg Arg
 35 40 45

Thr Leu Leu Val Ala Leu Leu Lys Gln Gly Glu Gly Glu Ala Ala Leu
 50 55 60

Ala His Val Asp Gln Leu Met Gln Gln Gly Glu Ala Asp Gly Pro Leu
 65 70 75 80

22/11/2005 17:33 41-31-531-37-89

UNITECTRA BERN

S. 25

Trp Leu Cys Arg Ser Arg Ala Cys Gln Leu Ala Gly Arg Leu Asp Glu
85 90 95

Ala Arg Phe Ala Tyr Gln Gln Tyr Leu Glu Leu Glu Glu Gln Asn Glu
100 105 110

Ser Thr His Pro
115

<210> 6
<211> 93
<212> PRT
<213> Aeromonas salmonicida

<400> 6

Met Leu Val Arg Arg Glu Gly Glu Arg Ala Gly Leu Ala Asn Pro Phe
1 5 10 15

Ala Ala Leu Tyr Leu Leu Ala Glu Ala Thr Leu Ala Val Leu Gly Pro
20 25 30

Gly His Phe Leu Tyr Gly Asn Val Asp Val Phe Arg Ser Ser Ser Leu
35 40 45

Ser Ser Glu Arg Leu Gly Arg Phe Tyr Leu Arg Trp Thr Gly Ala Ser
50 55 60

Glu Pro Glu Pro Gly Trp Phe Met Leu Ala Thr Glu Gln Val Cys Ser
65 70 75 80

Leu Arg Asp Met Arg Lys Arg Gln Lys His Gly Leu Ala
85 90

<210> 7
<211> 94
<212> PRT
<213> Aeromonas salmonicida

<400> 7

Met Lys Gln Pro Arg Phe Ala Asp His Ser Glu Thr Ile Ser Gln Ala
1 5 10 15

Glu His Gly Ile Ala Asp Ser Asp His Arg Asn Ala Leu Leu Gln Glu
20 25 30

Met Leu Ala Gly Leu Ala Leu Ser Asp Gln Thr Cys Gln Leu Leu Phe
35 40 45

Glu Ala Pro Thr Glu Gln Val Ala Val Ala Glu Gln Glu Leu Leu Ala
50 55 60

Page 4

22/11/2005 17:33 41-31-531-37-89

UNITECTRA BERN

S. 26

Glu Ile Gln Arg Arg Gln Ala Leu Leu Pro Ala Gln Pro Gly Glu Gly
65 70 75 80

Arg Lys Ser Arg Arg Pro Thr Ile Met Arg Gly Leu Met Ile
85 90

<210> 8
<211> 361
<212> PRT
<213> Aeromonas salmonicida

<400> 8

Met Ser Thr Ile Pro Asp Tyr Asn Thr Asn Pro Gly Ala Phe Val Gly
1 5 10 15

Trp Leu Asp Val Gln Ala Leu Asn Thr Leu Pro Gly Asn Lys Asn Pro
20 25 30

Lys Leu Thr Glu Leu Val Glu Leu Leu Lys Gly Lys Ile Thr Ile Ser
35 40 45

Ala Asp Ser Ser Thr Ala Leu Ser Lys Glu Gln Leu Glu Lys Leu Leu
50 55 60

Ala Ala Tyr Leu Thr Asp Pro Ala Ser Ile Asn Gly Gly Trp Ala Met
65 70 75 80

Gly Gln Phe Lys Gly Gly Gln Asp Ala Ala Ile Ala Ala Ile Lys Gly
85 90 95

Val Ile Glu Arg Gly Ala Lys Gln Thr Pro Pro Val Thr His Trp Thr
100 105 110

Ile Pro Glu Phe Met Leu Leu Ser Leu Ser Ala Leu Thr Met Glu Arg
115 120 125

Thr Asp Asp Asp Leu Ile Thr Thr Phe Thr Gly Val Met Met Phe Gln
130 135 140

Asp Asn Gln Arg Lys Gly Leu Arg Asp Glu Leu Ala Glu Met Thr Ala
145 150 155 160

Glu Leu Lys Ile Tyr Gly Val Ile Gln Ser Glu Ile Asn Gln Val Leu
165 170 175

Ser Ala Ala Ser Asn Gln Thr Phe Lys Thr Asn Phe Asn Leu Met Asp
180 185 190

Page 5

Tyr Lys Leu Tyr Gly Tyr Glu Ser Leu Ala Lys Phe Met Glu Gly Gly
195 200 205

Glu Phe Lys Leu Leu Ser Lys Met Phe Ser Asp Glu Gln Val Thr Lys
210 215 220

Ala Gln Gln Asp Phe Thr Asn Ala Lys Asn Glu Leu Glu Asn Val Thr
225 230 235 240

Ser Thr Ser Leu Asn Pro Lys Ile Gln Ala Glu Ala Lys Thr Asp Tyr
245 250 255

Glu Arg Lys Lys Ala Ile Phe Glu Glu Ile Val Glu Thr Gln Ile Ile
260 265 270

Thr Leu Lys Thr Phe Leu Glu Ser Asp Leu Lys Lys Ser Gly Ala Met
275 280 285

Ser Gly Ile Glu Ala Glu Tyr Lys Tyr Asp Lys Asp Asn Asn Lys Leu
290 295 300

Gly Asn Phe Ser Thr Ser Val Ser Asp Arg Ser Arg Pro Leu Asn Asp
305 310 315 320

Leu Val Ser Glu Lys Thr Ala Arg Leu Asn Asp Val Ser Ser Arg Tyr
325 330 335

Asn Ala Ala Ile Glu Ala Leu Asn Arg Phe Ile Gln Lys Tyr Asp Ser
340 345 350

Ile Met Arg Asp Ile Leu Gly Ala Ile
355 360

<210> 9
<211> 159
<212> PRT
<213> Aeromonas salmonicida

<400> 9

Met Gln Thr Asp Thr Thr Leu Thr Pro Glu Tyr Glu Ala Glu Leu Glu
1 5 10 15

Ala Phe Met Ala Asp Gly Gly Thr Leu Ala Met Leu Gln Asp Ile Ser
20 25 30

Gly Asp Thr Leu Glu Gln Leu Tyr Ala Leu Ala Phe Ser Gln Tyr Gln
35 40 45

Ala Gly Lys Trp Glu Asp Ala His Lys Ile Phe Gln Ala Leu Cys Met
50 55 60

Leu Asp His Tyr Glu Pro Arg Tyr Phe Leu Gly Leu Gly Ala Cys Arg
65 70 75 80

Gln Ala Met Gly Glu Phe Glu Thr Ala Val Gln Ser Tyr Ser Phe Gly
85 90 95

Ala Met Leu Asp Leu Lys Asp Pro Arg Phe Pro Phe His Ala Gly Glu
100 105 110

Cys Arg Leu Gln Gln Gly Asp Leu Asn Gly Ala Glu Ser Gly Phe His
115 120 125

Ser Ala Arg Leu Leu Ala Asp Thr Asp Pro Gln Gln Ala Asp Leu Ala
130 135 140

Ala Ser Ala Lys Val Met Leu Glu Ala Ile Ala Ile Arg Arg Asp
145 150 155

<210> 10

<211> 5678

<212> DNA

<213> *Aeromonas salmonicida*

<400> 10

gagctcaagc ggctgatccg cctgctgccg gtggagctgt tcagtgaaga ggagcagcgc	60
cagaatctgt tgcagtgtcg tcaggggtcg ctcgataacg ccacgcagcg ggaagaggat	120
gagttgtctg gagagtcgtc atgaactgga ttgaacccct gctggtgcag ttttgccagg	180
atttgggcat caccataggg gataaccccc attcgtgat ccagcttgaa ctggagcaga	240
gcggcactct gcagctggag cgccatcagg ggcaactgac cctatggttg gcccgcgccg	300
tgccttgga tcagagtggc gaggccattc gccgcgccat gaccttgact gccgcggcgc	360
aagggccggc actgccggtg cgcagcggct ggttggggga ggagcagtg atcctcttcg	420
tctccctgga tgagcgggac gtgactctgc cccagctcca tcaggccgtg accacctga	480
cccggttgca gcgagagglg ctggcgctcat gagccggatc actgccgcgc atatcggtat	540
cgagcagctc agcgccatct cctcgacga tcaggagcgc agcctgccgg ggcgttatgc	600
cctggtgccc gatggccagt ccacgaacc ccatatcagc cgcctctacc ccgagcggct	660
ggcggatcgg gtgctgctcg atttcgccac cccggatcgc ggctttcacg acttgctgcg	720
accggtcgat ttcaatcagg cgatgcagg gctgcgcagt gtgctggcag aggggcagag	780
ccccgaattg cgagcggcgg ccgcgctgct cgaacaaatg cagccgatg aacaactgat	840
gcagatgacc ctcatctgc tgcacaaggc atgaccatgg tgcttacgtc acagcagcag	900

gatgcgctgc tgctcaccg ctggttgcaa ctgcaaratg gccaccctga caaggcgagc 960
gtgctgctgg ccgccctgct gcagatccac ccgaccatc agggagggcg acggaccttg 1020
ctggtggccc tgctcaaaac gggggagggg gaggcgggcg tggcccatgt cgatcagctg 1080
atgcagcaag gggaggccga cggcccgctc tggctctgtc gcagccgagc ctgccagttg 1140
gcaggcgggc tggatgaagc ccgttttgcc tatcaacaat acctcgaact ggaagagcag 1200
aatgaatcaa cgcacccttg agttgctgcy ccggataggc gaacgcaagg acatcatgct 1260
ggcgatcctg ctgctggcca tcgtctttat gatggtcttg ccgctgccgc cgggtggcct 1320
cgatatcctg attgccatca acatgaacct ctcggtggta ctgctgatga tggcggttta 1380
tatcaattcg ccgctgcagt tctccgcctt tccggcgggtg ctgctgatca ccacctgtt 1440
ccggcttgcc ttgtcgggta gtaccaccgc gatgatcctg ctgcaggctg atgcggggca 1500
gatagtctac accttcggca acctcgtggt ggggggcaat ctggtggtgg ggatcgctac 1560
cttctctatc atcaccatcg tccagtttct ggtgatcacc aagggtctcg agcgggtcgc 1620
cgaggtgagc gcccgcttlt cctcgcgtc catgccgggt aagcagatga gtatcgatgg 1680
tgacatgcgc gccgggggtga tcgacgtgca cgaggcgcg gatcgccgcg gggtcatcga 1740
gaaggagagc cagatgttcg gctccatgga tggcgccatg aagtttgta agggggacgc 1800
catcggggc ctratcatra tcttegtcaa catcctcggg ggcgtcacca tcggggtgac 1860
ccagaagggg ttatccgcgc ccgatgcyct gcagctctac tccatcctga cgggtgggtga 1920
tggcatggtc tcccaggtgc cggcgctgct gatcgccatc accgcgggca ttatcgctac 1980
ccgggtctcc tccgaagagt ctccgatct gggtaaccgat atcggcgcc aggtggtggc 2040
ccagcccaag gcgctactga tcggcggtct gctgctgggt ctgttcgggt tgatcccg 2100
cttccgatg atcaccttct ttgcgctgtc ggccatcgtc accgcgggcg gttactttat 2160
cggcttgca caacgcaagg cgcaaagcag caacagtcag gatcttcctg ccgtgctggc 2220
gcaggggggc ggggccccag ctgcccgcag caagccaaaa ccgggcagca agccgcggg 2280
caagctgggg gagaaggagg agtttgccat gacggtgccg ctcttatctg atgtggatgc 2340
tgctttgcag gccgagctgg aggcgattgc cctcaacgac gaactggtgc ggggtgcgcg 2400
cgccctctat ctcgatctcg gggtgctttt cccgggtatt cacctgcgtt tcaacgagg 2460
gatggggcct ggcgaatacc tgatccagct gcaggagggt ccggtcgccc gcggtctgct 2520
gcgcccgggc catcagctcg tgcaggagag cgctcccgag ctcgatctgc tggggatccc 2580
ctacgaagag ggggcggcct tactgcccgg acaaccgacc ttgtgggtcg ctaatgaaca 2640
tcaggagcga ctggagaact cacggctggc caccctcacc accgatcagg tgatgacctg 2700
gcatttatcc catgtgctgc gggaaatagc cgaggacttt atcggcattc aggagacccg 2760
ctacctgctg gagcagatgg aggggagcta tagcgagctg gtgaaggagg cgcaacgc 2820

catcccgtcg cagcgtatga ccgaaatitt gcagcggctg gtgggggagg atatctccat 2880
ccgcaacatg cgcgccatcc tcgaggcgat ggtggagtgg ggccagaagg agaaggatgt 2940
ggtgcagctc accgagtaca tccgtagcag cctcaagcgc tacatctgct acaagtacgc 3000
caacggcaac aacattttgc ctgcctatct gctcgatcag caggtggagg agcagctccg 3060
cggcggcatt cgccagacta gtgccggcag ctatctggcg ctcgatccca ctattaccca 3120
gagcttcctc gatcagggtgc gccacaccgt cggtgatctg gcccagatgc agaacaaacc 3180
ggtgctcatt gtctccatgg atatccgccg ctatgtgcgc aagctcatcg agggggatta 3240
ccatgccctg ccggtgctct cctatcagga gctgacccag cagatcaata tccagcccct 3300
cgggagggtc tgctgtgag gggggacccg ttaacctctg accccctgat cccctggctg 3360
caggccaagg gtgtggcggt tgcctctcac tatctggggg caaccccat ccagctcggc 3420
cacgctttct gctatcgcca aatttatctc gcctggcggg ttgatcctac gaccgcagcg 3480
gtctggatca tgctggtgcg ccgagagggg gagcgggctg gactggccaa tccctttgcc 3540
gccctctatc tgetggccga agccactctg gctgtactcg gtccgggcca ttctctctac 3600
ggcaacgtcg atgtctttcg aagcagtagc ctgagcagtg agcggctagg ccgcttctac 3660
ttgcgtgga cgggagccag tgaacccgag cccggctggt tcatgttggc caccgagcaa 3720
gtctgttcac tacgggatat gcgaaaacga caaaagcacg gccttgctg acaggcatgt 3780
ccaaaagggc ctcatagaat aggagccaag atgaacaac cgcgttttgc cgaccatagc 3840
gagaccattt cgcaggcaga gcatggcatt gccgacagcg atcaccgcaa tgccctgttg 3900
caagagatgc tggctggcct agccctctcg gatcagacct gtcagctgct gtccgaagcg 3960
ccgaccgagc aagtggcctt ggccgagcag gagttgttg cagagatcca gcgcagacag 4020
gcgttactac cggcacagcc gggagagggc cgaaaagtc gccgtcccac cattatgcgc 4080
ggactgatga ttaaggaat cgtgatgagc acaatccctg actacaacac taaccccggc 4140
gcgttcgtcg gctggcttga tgtgcaagca ctgaacacat tgccgggcaa taaaaatccc 4200
aagttgaccg aactggctga gctgctcaag ggcaagatca ccatcagtgc tgactcatcg 4260
actgcgctga gcaaggagca gctggagaag ttgctggctg cctatctgac ggatcctgcc 4320
tcgatcaacg ggggctgggc gatgggccag ttcaaggag gtcaagatgc cgccattgcc 4380
gccatcaagg gggtagcga gcggggagca aaacaaacc cgccagtcac cactggacc 4440
atccctgaat ttatgctgt ctccctcagt gcgtgacca tggaacgtac cgatgacgat 4500
ctcatcacga cctttaccgg ggtgatgatg ttccaggaca atcagcgtaa aggggtgcgg 4560
gatgagctgg cagagatgac cgctgagctg aagatctacg gggtagatcca gtccgagatc 4620
aaccaggtgc tctctgcggc gtccaacaa accttcaaaa ccaatttcaa tctgatggat 4680
tacaagctct atggctatga gtctctggcc aaatttatgg aagggggcga gttcaagctg 4740

ttgtcaaaaa tgtttagcga tgagcaggtg acaaaagcac agcaagattt caccaatgct 4800
 aaaaatgagc tggaaaacgt cacgtcgacc agcctaacc ccaaaatcca ggcggaagct 4860
 aagaccgatt atgagcgtaa aaaagccatt tttagaggaga tcgtagagac gcagatcatc 4920
 acccttaaaa cgttcctgga aagtgacctg aagaagagcg gcgccatgag tggcatagaa 4980
 gccgagtaca aatatgacaa agacaacaac aagcttggca acttctccac tagtgtgagc 5040
 gaccgttctc gcccgctcaa cgatctggtc agtgaaaaga ccgcccgcct caacgacgct 5100
 agttcgcgct acaacgctgc catcgaggca ctcaaccgct ttatccagaa atacgacagc 5160
 atcatgcgcy acattcttgc cgcaatttga ggagagatca tgcagaccga caccacctg 5220
 accccggaat atgaagcaca gctggaggcc ttatggctg acggtggtag cctggctatg 5280
 ctgcaggata tctctggcga caccctggaa cagctctatg cctggcctt tagccagtat 5340
 caggccggca agtgggaaga tgctcacaaa atcttccagg ctctctgcat gctggatcac 5400
 tacgagccac gctatttccg cgggctgggt gcttgccgct aggcgatggg ggagtttgaa 5460
 acggcagttc agagttacag ctttggcgcc atgctcgacc tgaaagatcc ccgtttccca 5520
 ttatcatgcag gcgagtgcg gctgcaacaa ggtgatttga acggtgccga gagtggcttc 5580
 cactcggccc gactgctggc ggacacagat cccagcagg cagacctggc ggcaagcgcc 5640
 aaggctcatgt tggaaagccat cgcaatcaga agggatcc 5678

<210> 11
 <211> 30
 <212> DNA
 <213> Artificial

<220>
 <223> synthetic primer.

<400> 11
 gggaattcga tgagcacat cctgactac

30

<210> 12
 <211> 30
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic primer.

<400> 12
 atgcggccgc aaattgcgac aagaatgtcg

30

<210> 13
 <211> 29
 <212> DNA
 <213> Artificial

<220>
 <223> Synthetic primer.

<400> 13
tcgcggccgc accctttacg ctgattgtc

29

<210> 14
<211> 28
<212> DNA
<213> Artificial

<220>
<223> Synthetic primer.

<400> 14
cggaattcgt tgcgggatga gctggcag

28

<210> 15
<211> 30
<212> DNA
<213> Artificial

<220>
<223> Synthetic primer

<400> 15
tcgcggccgc actcggcttc tatgccctc

30